AD-A154 687 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS AMERICAN TISSUE DAM (.. (U) CORPS OF ENGINEERS WALTHAM MA NEW ENGLAND DIV OCT 78 1/1

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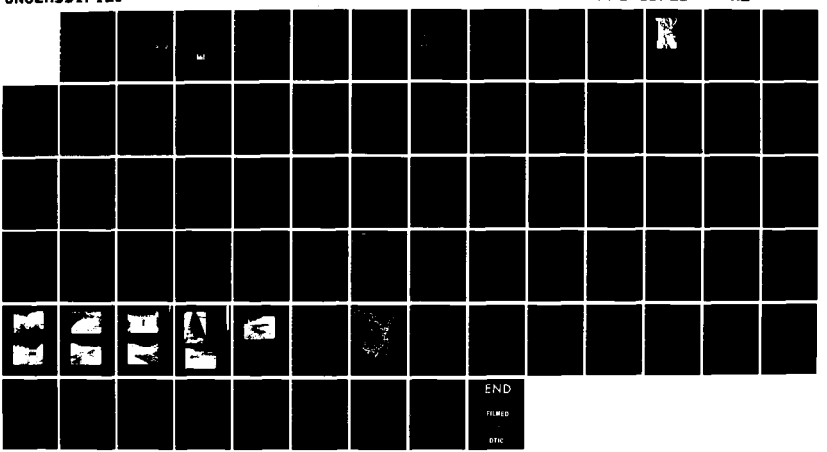

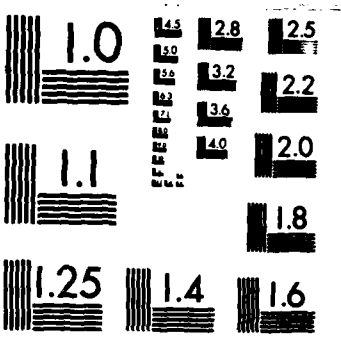

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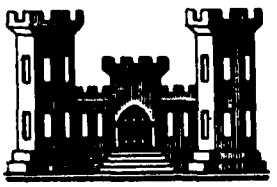
GARDINER, MAINE

AMERICAN TISSUE DAM
ME-00094

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

OCTOBER 1978

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Kennebec River Basin
Gardiner, Maine

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is a stone masonry gravity type structure. It is about 430 ft. long and about 24 ft. high/ The dam is judged to be in fair condition. The dam structure appears to be in good condition but the gate works are in poor condition. It is small in size woth a high hazard potential.

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AMERICAN TISSUE DAM

ME-00094

KENNEBEC RIVER BASIN

GARDINER, MAINE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

ME-00094

AMERICAN TISSUE DAM

GARDINER
KENNEBEC COUNTY, MAINE

KENNEBEC RIVER BASIN

AUGUST 15, 1978

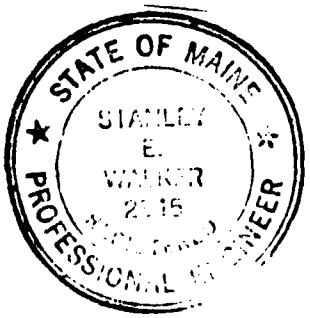
BRIEF ASSESSMENT

The American Tissue Dam is a stone masonry gravity type structure. The dam is about 430 feet long and about 24 feet high.

Based on the visual inspection and past operational performance the dam is judged to be in fair condition. The dam structure appears to be in good condition but the gate works are in poor condition. The dam is not presently operated.

Based on its small size and high hazard classification, in accordance with the Corps of Engineers' guidelines, the test flood falls between 1/2 and 1 times the probable maximum flood (PMF). The spillway will pass only about 11 percent of the test flood and is considered inadequate. The spillway will, however, pass approximately a 500-year flood.

Although no major modifications to the dam appear necessary, a thorough evaluation of the hydraulics and hydrology of the dam and watershed should be made. The remedial measures outlined in Section 7.3 should be implemented within 12 months after receipt of this report by the owner. An item of particular importance is the repair, replacement or removal of the control and penstock gates. Also, a plan for around-the-clock surveillance during periods of anticipated high runoff and a formal warning system should be developed and implemented.



EDWARD C. JORDAN CO., INC.

Stanley E. Walker, P.E.
Project Manager

This Phase I Inspection Report on American Tissue Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Charles G. Tiersch

CHARLES G. TIERSCH, Chairman
Chief, Foundation and Materials Branch
Engineering Division

Fred J. Ravens Jr

FRED J. RAVENS, Jr., Member
Chief, Design Branch
Engineering Division

Saul Cooper

SAUL COOPER, Member
Chief, Water Control Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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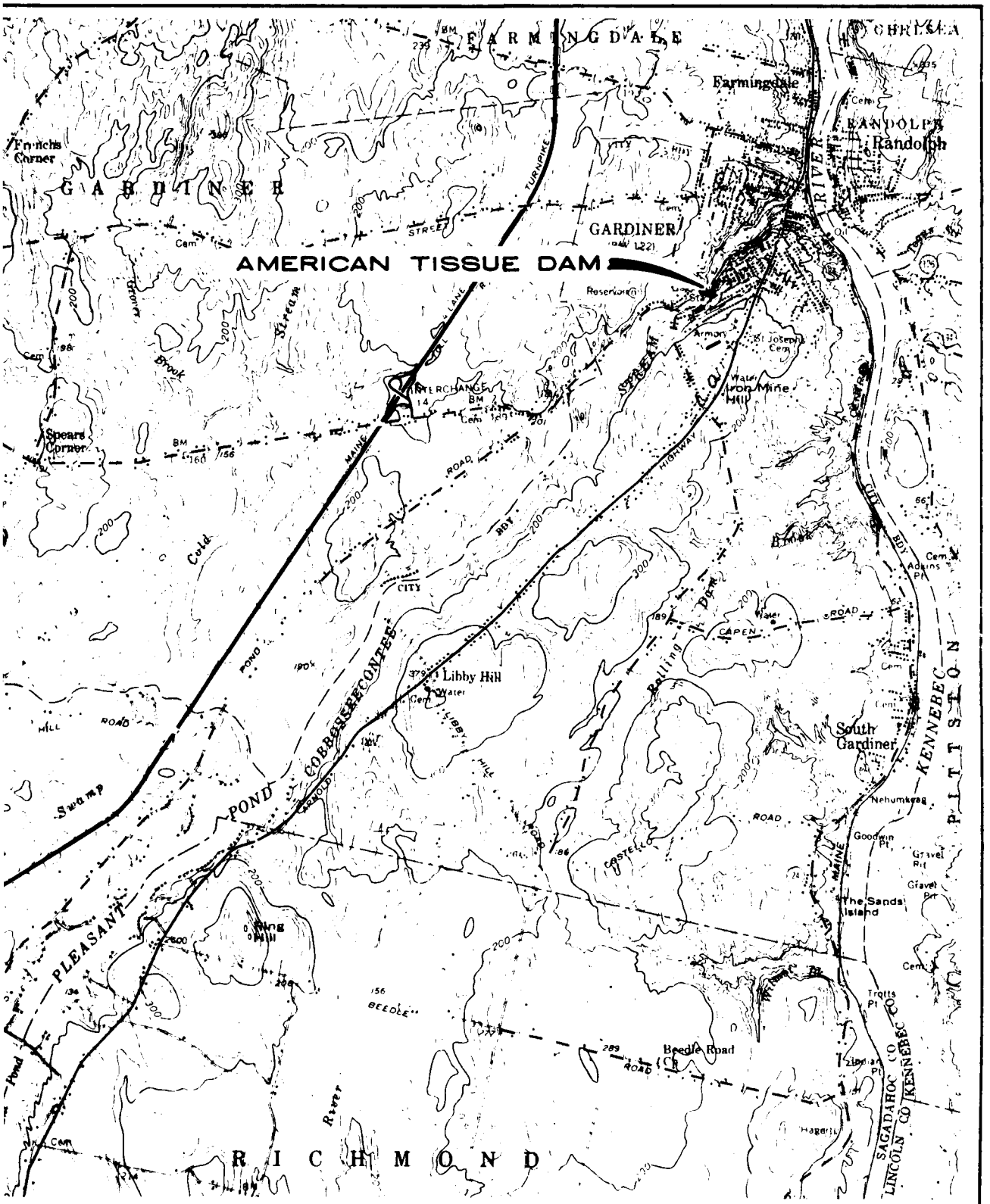


EDWARD C. JORDAN CO., INC
PORTLAND, MAINE

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

AMERICAN TISSUE DAM
LOCATION MAP

COBBOSSEECONTEE STREAM MAINE

DATE OCTOBER 1978

PHASE I INSPECTION REPORT

AMERICAN TISSUE DAM

SECTION 1

PROJECT INFORMATION

1.1 GENERAL

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Maine. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of June 20, 1978 from Ralph T. Garver, Colonel, Corps of Engineers. Contract No. DACW33-78-C-0349 has been assigned by the Corps of Engineers for this work.

b. Purpose

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate quickly effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location. The dam is located on the Cobbosseecontee Stream about one mile west of the confluence

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Based on the visual observations, the dam appears to have good structural stability. Three areas of concern are 1) the loose mortar joints near the outlet sluiceways, 2) the clogged under-drainage pipe, and 3) erosion of the bedrock downstream of the spillway. Continued deterioration of the mortar joints near the sluiceway may result in the displacement of some of the masonry which composes a structural element of the dam. The loss of efficiency of the underdrain system leads to concern for the overall mass stability of the structure, since a buildup of hydrostatic pressure could potentially occur within the foundation of the dam. Such a pressure buildup would seriously effect the stability of the dam. Continued erosion of the bedrock downstream of the spillway could lead to undermining of the dam foundation.

b. Design and Construction Data. No data regarding original design or construction of the dam was disclosed.

c. Operating Records. None available.

d. Post Construction Changes. The lack of recorded data makes the assessment of post construction changes difficult. No settlement or horizontal movement is apparent. Some spalling of concrete and loosening of the mortar has occurred and the power wheel has been removed from the lower end of the penstock.

e. Seismic Stability. The dam is located in seismic Zone No. 1 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

hydrographs according to rule of thumb methods as described in an attachment to ETL 1100-2-234. The failure analysis assumes a breaching of the dam at full spillway capacity (top of dam). The wave height just downstream of the dam would be about 23 feet. At the Yorktown Dam, about 750 feet downstream, the wave height would be about 16 feet above spillway crest. Therefore, in the event of failure of the American Tissue Dam, there would be damage to the Yorktown Paper Company buildings on the banks of Cobbosseecontee Stream adjacent to the Yorktown Dam. If there was no warning to evacuate the employees of the Yorktown Paper Company before the American Tissue Dam failed, then there would also be a great danger for the loss of life within the paper company.

FLOOD DATE	DISCHARGE, (cfs)	APPROXIMATE RECURRENCE INTERVAL, (Years)
1936	4320	100
1922	4250	50
1921	3910	25
1917	3870	25
1920	3580	10
1903	3280	10
1901	3200	10

Since the spillway alone has a capacity in excess of the 500-year flood event, it is unlikely that the dam has ever been overtopped. However, no record of flood stages could be located to confirm this.

d. Visual Inspection. Flow is controlled at the American Tissue Dam by 3 vertical lift gates, a penstock, and a spillway. Only one of the vertical lift gates appeared to be operational, and the penstock did not appear to be operational. The gates were not operated during the visual inspection. However, there was leakage observed to be coming from around all three gates and through the penstock.

e. Test Flood Analysis. The American Tissue Dam is classified as having a high hazard potential. Therefore, the dam must be analyzed for passing the probable maximum flood. The probable maximum flood (PMF) has been calculated to be about 67,300 cfs, according to the COE's "Preliminary Guidance for Estimating Probable Maximum Discharges in Phase I Dam Safety Investigations." Consideration of the effect of surcharge storage, (according to the same COE reference), reduces the PMF to 55,700 cfs. The PMF would overtop the dam by about 11 feet. The total spillway capacity at the top of the dam is about 5,900 cfs, which is about 11 percent of the routed PMF.

f. Dam Failure Analysis. The hazard potential was determined by analyzing downstream dam failure

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. General. The American Tissue Dam is a granite block dam located in a steep sided valley on the Cobbosseecontee Stream in Gardiner, Maine. The dam has a small impounding capacity of about 120 acre-feet.

b. Design Data. Design data was not available.

c. Experience Data. The U.S. Department of the Interior, Geological Survey (USGS) has published gaged flow data for Cobbosseecontee Stream at Gardiner, Maine, (Gage Number 01049500, Drainage Area 217 square miles), for a period of record from 1890 to 1964 and 1976 to present. From data recorded at this gage a log-Pearson Type III statistical analysis was furnished by the USGS. The following is a table of flood discharges from American Tissue Dam.

RECURRENCE INTERVAL, (Years)	FLOW, (cfs)
10	3238
25	3746
50	4102
100	4441
200	4767
500	5182

A review of past gaged floods revealed the following pertinent discharges.

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

No written description of operating procedures are available. The dam is not presently operated and water levels are governed by flow conditions in the stream.

4.2 MAINTENANCE OF DAM

No routine maintenance is known to be done on the dam.

4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities are in a state of disrepair and no maintenance is known to have been done recently.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

None

4.5 EVALUATION

Although no maintenance has been done on the dam or its facilities recently, the dam is in good structural condition. The operating facilities are, however, in poor condition.

severe leakage is occurring through the gate. The gate lifting equipment is inoperable. It has broken gears and the stantion is cracked.

The penstock is a 10-foot diameter riveted steel pipe with a reinforced concrete lining. The penstock discharges free downstream of the dam. The power wheel has been removed. The steel trash rack above the penstock gate is badly deteriorated and was heavily loaded with debris.

d. Reservoir Area. The reservoir consists of the small pond about 12 acres in area and 1200 feet in length, situated between the American Tissue Dam and the Gardiner Water District Dam, as shown in photograph 2. The commercial structure seen in photograph 2 near the edge of the pond is at or above the elevation of the top of the dam. There is some silt deposited at the upstream side of the dam, but not enough to appear to hinder operation of the gates or penstock.

e. Downstream Channel. The channel immediately below the dam is bedrock consisting of mica schist and feldspathic gneiss. The bedrock has been severely eroded in some areas below the spillway, see photograph 3. The bedrock surface shows evidence of past movement along fractures striking northeasterly. The dam structure shows no evidence of movement since construction of the dam related to the bedrock fractures. The channel is clear of debris and trees are growing upright next to the channel.

3.2 EVALUATION

Based on the visual observations, the American Tissue Dam appears to be in good structural condition, but the gateworks are in poor condition. The structure lacks the benefit routine maintenance.

(f) Some tree and brush growth has occurred in the masonry of the dam. The embankment sections of the dam are tree and brush covered.

(g) The cap stones in the spillway are solidly mortared. The iron u-pins which attach the stones to each other are badly rusted but are intact.

(h) The 4-inch diameter drain pipe which outlets at the bottom of the downstream face of the spillway is clogged with lime (calcium carbonate). The 1-inch diameter line higher in the spillway face also appeared to be clogged.

(2) Hydraulics - At the time of the visual inspection, August 15, 1978, the pond level was at approximately elevation 124.4, about 8.4 feet below spillway crest. Substantial flow was being passed as leakage through the 3 vertical-lift gates and the penstock, as shown in photographs 1 and 6. The middle vertical-lift gate was passing substantial leakage and the penstock was carrying a 1.5 foot depth of flow.

The approach channel was unobstructed. The distance upstream to the Gardiner Water District Dam was estimated to be about 1200 feet.

c. Appurtenant Structures. Appurtenant structures at the dam consist of the gate works and the penstock. These structures are in poor condition, and they were not operated during the visual inspection. The outlet gates are constructed of timber and have timber lift stems. The operating mechanism for each gate is a manually operated series of gears which lift the gates. See photograph 5. Of the three outlet control gates, only one appears operable. The southerly gate is missing its riser stems, the middle gate appears operable, and the northerly gate has a broken drive gear. The penstock gate is constructed of timber with timber lift stems. This gate is badly deteriorated and

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General. The dam is located in a steep sided valley. The dam appears to be founded on bedrock and no signs of serious structural distress are in evidence.

b. Dam.

(1) Structural - The dam is constructed of mortarlaid cut stone masonry. The structure appears to be in good condition but lacks the benefit of routine maintenance. See Appendix A for detail inspection findings.

The inspection of the dam resulted in the following major findings.

(a) The stone masonry portion of the dam is in good condition. The mortared joints are generally sound.

(b) The downstream face of the seutherly portion of the spillway and of the outlet and penstock portion of the dam are heavily lime-encrusted. Some seepage is presently occurring through these portions of the dam.

(c) The mortar joints near the outlet end of the control outlet sluiceways are badly deteriorated. The mortar is loose and in many areas missing.

(d) The concrete roof section of the outlet sluiceways is badly spalled in some areas.

(e) Substantial erosion has occurred in the bedrock in the downstream channel below the dam. No undermining of the foundation has occurred.

SECTION 2

ENGINEERING DATA

2.1 DESIGN

None available

2.2 CONSTRUCTION

None available

2.3 OPERATION

No description of operating procedures are available.

2.4 EVALUATION

a. Availability. No data is available regarding design or construction of the facilities.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, performance history and engineering judgment.

c. Validity. Not applicable.

Length - 100 feet

Crest Elevation - 132.8 (msl datum)

Gates - None

Upstream Channel - small 12 acre pond that extends 1200 feet from the American Tissue Dam to the Gardiner Water District Dam.

Downstream Channel - consists of severely eroded bedrock and is clear of debris. Trees are growing upright next to the channel.

General - Not applicable.

j. Regulating Outlets

Invert - 110.5 (msl datum)

Size - 5 feet wide, 5.5 feet high

Description - There are three regulated outlets closed by timber vertical lift gates. The outlet conduit consists of stone masonry with a concrete roof.

Control Mechanism - The gate control mechanism consists of a vertical rack and gear and reducing gears which are manually operated for each gate, see photograph 5. Two of the three gates are mechanically inoperable, the southerly gate has no riser stems and the northerly gate has a drive gear with broken teeth.

Other - Water flow is currently occurring through a 10-foot diameter concrete lined, riveted steel penstock which previously served the power wheel. This penstock presently serves as an outlet for the dam since it has free discharge below the dam.

by about 1 foot. Therefore additional areas, including Pleasant Pond, have been included here as reservoir area.

ITEM	SURFACE AREA (acres)
Recreation Pool	12
Flood Control Pool	N/A
Spillway Crest Pool	12
Test Flood Pool	3200
Top of Dam	2812

g. Dam

Type - Gravity type, stone masonry construction.

Length - South embankment approximately 210 feet, stone masonry section 190 feet, and north embankment 30 feet. See plan and profile in Appendix B.

Height - The top of the dam is 30 feet above streambed.

Top Width - Varies, see cross-sections in Appendix B.

Side Slopes - See cross-sections in Appendix B.

Zoning - See cross-sections.

Impervious Core - Stone masonry.

Cut-off - Stone masonry placed on bedrock.

Grout Curtain - Not applicable.

Other - None.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway

Type - Broad crested Weir

c. Elevation

LOCATION	ELEVATION (feet above MSL)
Top of dam	139.1
Maximum pool - design surcharge	Unknown
Full flood control pool	N/A
Recreation pool (normal pool)	132.8
Spillway Crest	132.8
Diversion Tunnel Invert	N/A
Streambed at Centerline of Dam	115
Maximum Tailwater	Unknown
Test Flood Elevation (PMF)	150.0

d. Reservoir.

LOCATION	LENGTH (feet)
Length of Maximum Pool	1200
Length of Recreation Pool	1200
Length of Flood Control Pool	N/A

e. Storage. At elevation 139.1, top of dam, the Gardiner Water District Dam, which is about 1200 feet upstream from the American Tissue Dam, becomes submerged and additional areas including Pleasant Pond are controlled by the American Tissue Dam.

ITEM	STORAGE (acre-feet)
Recreation Pool	108
Flood Control Pool	N/A
Design Surcharge	Unknown
Top of Dam	2812

f. Reservoir Surface. At elevation 139.1, top of dam, the Gardiner Water District Dam is submerged

g. Purpose of Dam. The dam presently serves no purpose.

h. Design and Construction History. The construction of the dam predates 1911. No design or construction information was found to be available.

i. Normal Operating Procedures. The dam is not presently operated and water levels are governed by the flow conditions in the stream.

1.3 PERTINENT DATA

a. Drainage Areas. The drainage area consists of about 217 square miles of gently sloping wooded terrain.

b. Discharge at Damsite. No record of high water could be located. Therefore, maximum known flood height at the dam could not be determined.

(1) Outlet works (conduits) - There are 3 gate openings which are about 5 feet wide by 5.5 feet high. The upstream inverts of the gates are all at about elevation 110.5. The penstock opening is about 10 feet in diameter and its upstream invert elevation is about 113.0.

(2) Maximum known flood at the damsite was 4320 cfs on March 20, 21, 1936.

(3) Ungated spillway capacity at the top of the dam is 5880 cfs.

(4) Ungated spillway capacity at test flood (PMF) elevation is about 22,000 cfs at elevation 150.0.

(5) Gated spillway capacity is not applicable.

(6) Total project discharge at test flood elevation is 55,700 cfs at elevation 150.0.

of the Cobbosseecontee Stream and the Kennebec River. It is located about 1/2 mile west of the built-up portion of the city of Gardiner. N 44°-14', W 69°-47'

b. Description of Dam and Appurtenances. The American Tissue Dam is a mortar laid cut stone masonry dam. It is a gravity type structure. The masonry portion of the dam is approximately 190 feet long. The south wing wall is about 210 feet long and the north wing wall is about 30 feet long. There are 3 gates, 2 of which are inoperable, and a 10 foot diameter penstock which is inoperable. The spillway is about 100 feet long.

c. Size Classification. Based on a storage capacity of 108 acre-feet and a height of about 24 feet, the American Tissue Dam is classified as a small sized dam, storage greater than 50 but less than 1000 acre-ft or height greater than 25 but less than 40 feet.

d. Hazard Classification. In the event of failure of the American Tissue Dam, the Yorktown Paper Company factory buildings about 750 feet downstream of the dam would be damaged. Should the failure occur during working hours at the paper company, there would be a great chance for the loss of many lives. Thus the American Tissue Dam is classified as having a high hazard potential.

e. Ownership. The present owner of the dam is Allen Paper Co., 45 NW Station Plaza, Great Neck, New York 11021.

The dam was previously controlled by the Gardiner Water Power Company and apparently has been previously owned by S. D. Warren Company, and American Tissue Mills, Inc.

f. Operator. The dam has no local operator. The owner's representative relative to the dam is: Mr. David Usdan, Allen Paper Co., 45 NW Station Plaza, Great Neck, New York 11021. Telephone: 1-516-482-5300

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition. Based on the data obtained from the visual inspection the American Tissue Dam is assessed to be in fair condition. The spillway of the dam will pass approximately a 500-year flood discharge. The probable maximum flood (PMF) peak inflow to the dam has been calculated to be 67,300 cfs. Due to the effect of surcharge storage, the dam has to pass a reduced peak flow of about 55,700 cfs. To pass this flow the structure would be overtopped by about 11 feet. The spillway capacity is about 11 percent of the routed PMF.

Major concerns regarding the American Tissue Dam are 1) the need for maintenance to the operating facilities, 2) the loose masonry near the outlet sluiceways, 3) the erosion of the bedrock below the spillway, 4) the clogged underdrain system, and 5) the inadequate spillway capacity.

b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection, the past operational performance of the dam, and engineering judgment.

c. Urgency. The recommendations outlined in 7.2 below should be implemented within 24 months after receipt of this report by the owner. The remedial maintenance of the facilities should be implemented within 12 months.

d. Need for Additional Investigation. Additional investigation is not considered necessary for the current assessment.

7.2 RECOMMENDATIONS

Since the spillway capacity is considered inadequate, a qualified engineer should make a further evaluation of

the hydrology and hydraulics of the watershed and dam and design additional spillway capacity as may be warranted.

7.3 REMEDIAL MEASURES

a. Operating and Maintenance Procedures. The dam and facilities lack the benefit of maintenance. A program of regular inspection and maintenance should be implemented and a record of activities should be kept. The following operating and maintenance procedures should be implemented within 12 months after receipt of this report by the owner:

1. Fill and stabilize the eroded depressions in the bedrock below the spillway of the dam.

2. Clear the underdrain pipe which outlets in the downstream face of the dam.

3. Repair the joints in the masonry at the outlets of the gated sluiceways.

4. Repair or replace the gate hoisting equipment and the gates for the penstock and the control outlets, and remove the trash rack at the penstock headworks.

5. Cut all brush and trees from the masonry face of the dam.

6. Repair the spalled concrete in the roof sections of the outlet sluiceways.

7. Provide around the clock surveillance during periods of anticipated high runoff.

8. Develop a formal warning system and implement its use in the event of an emergency.

9. Have inspections of the dam made by qualified engineers once every two years.

7.4 ALTERNATIVES

In lieu of the remedial maintenance outlined in Section 7.3, the gates could be removed from the dam allowing flow to pass through the gated sluiceways and the penstock. The masonry joints at the outlet end of the sluiceways would have to be pointed and the trash rack upstream of the penstock would have to be removed.

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT American Tissue Dam

DATE 8-15-78

TIME 10:00 A.M.

WEATHER Fair

W.S. ELEV. 124.4 U.S. 112.0 DN.S.

PARTY:

1. Brian Bisson
2. Stephen Cole
3. John Kimble
4. Ernest Jurick
5. Henry Oatley
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	Stephen Cole	
2.	Hydrology/Hydraulics	Brian Bisson	
3.	Structural	Henry Oatley	
4.	Survey	John Kimble	
5.	Photography	Ernest Jurick	
6.			
7.			
8.			
9.			
10.			

NOTE: See Supplementary Inspection Notes Following Checklist

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Dam Embankment NAME Stephen Cole

DISCIPLINE Geotechnical NAME

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT	
Crest Elevation	139±
Current Pool Elevation	124±
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	Turf, bushes and trees
Movement or Settlement of Crest	None observed
Lateral Movement	None observed
Vertical Alignment	Okay
Horizontal Alignment	Okay
Condition at Abutment and at Concrete Structures	Okay
Indications of Movement of Structural Items on Slopes	None
Trespassing on Slopes	None
Sloughing or Erosion of Slopes or Abutments	None
Vegetation	Bushes, trees and grass
Rock Slope Protection - Riprap Failures	No Riprap - No apparent erosion
Unusual Movement or Cracking at or near Toes	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	N/A

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Outlet Works NAME Stephen Cole

DISCIPLINE Geotechnical NAME Brian Bisson
Hydrology/Hydraulics
Structural Henry Oatley

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Okay
Bottom Conditions	Some debris - silty
Rock Slides or Falls	None observed
Log Boom	None
Debris	Logs & brush upstream of gates
Condition of Concrete Lining	None
Drains or Weep Holes	None
b. Intake Structure	
Condition of Stone Masonry	Good
Gates and Slots	Gates rotted; slots okay

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Outlet Works NAME Stephen Cole

DISCIPLINE Geotechnical NAME Brian Bisson
Hydrology/Hydraulics
Structural Henry Oatley

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Masonry and Structural	
General Condition	Good
Condition of Joints	Good
Spalling	None
Visible Reinforcing	None
Rusting or Staining of Concrete	Heavy lime encrustation
Any Seepage or Efflorescence	Minor seepage near toe
Joint Alignment	Good
Unusual Seepage or Leaks in Gate Chamber	One gate leaking badly
Cracks	None
Rusting or Corrosion of Steel	None
b. Mechanical and Electrical	
Air Vents	None
Float Wells	None
Gate Hoists	One operable, 2 inoperable poor condition
Elevator	None
Hydraulic System	None
Service Gates	Rotted - poor condition
Emergency Gates	N/A
Lightning Protection System	N/A
Emergency Power System	N/A
Wiring and Lighting System	N/A

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Outlet Works NAME Stephen Cole

DISCIPLINE Geotechnical / Structural NAME Henry Oatley

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete & Masonry	Fair, some spalling of concrete and some loose masonry joints
Rust or Staining on Concrete	Heavy lime encrustation
Spalling	Severe spall in some areas
Erosion or Cavitation	None
Cracking	None
Alignment of Monoliths	Okay
Alignment of Joints	Okay
Numbering of Monoliths	None

PERIODIC INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Outlet Works NAME Stephen Cole

DISCIPLINE Geotechnical NAME Brian Bisson
Hydrology/Hydraulics Henry Oatley
Structural

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Masonry	Fair, some loose joints
Rust or Staining	Heavy lime encrustation
Spalling	None
Erosion or Cavitation	None
Visible Reinforcing	N/A
Any Seepage or Efflorescence	None
Condition at Joints	Some loose
Drain holes	None
Channel	Bedrock - good
Loose Rock or Trees Overhanging Channel	None
Condition of Discharge Channel	Clear

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Outlet Works NAME Stephen Cole

DISCIPLINE Geotechnical NAME Brian Bisson
Hydrology/Hydraulics Henry Oatley
Structural

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Generally clear
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Silted
b. Weir and Training Walls	
General Condition of Masonry	Good
Rust or Staining	Minor lime stain
Spalling	N/A
Any Visible Reinforcing	N/A
Any Seepage or Efflorescence	Seepage from lower portion of downstream face
Drain Holes	Clogged with $CaCO_3$
c. Discharge Channel	
General Condition	Okay, clear
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Deep scower into bedrock is evident
Other Obstructions	None

INSPECTION CHECKLIST

PROJECT American Tissue Dam DATE 8-15-78

PROJECT FEATURE Service Bridge NAME --

DISCIPLINE -- NAME --

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Super Structure	NOT APPLICABLE
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

SUPPLEMENTARY INSPECTION NOTES

1. CONCRETE AND STONE MASONRY STRUCTURE

a. Concrete Surfaces - the only concrete surfaces in the dam are the upper portions of the control outlet sluiceways. These surfaces are heavily lime stained and some areas are badly spalled.

Stone Masonry - the stone masonry portion of the dam is mortar laid, cut stone and is in generally good condition. The joints in the stone masonry are tight, however, there is substantial lime encrustation on the surface of the masonry. Some brush growth has occurred in the face of the masonry.

b. Structural Cracking - no cracking of structure elements of the dam were found during inspection.

c. Movement - no horizontal or vertical movement of the dam was observed.

d. Junctions - the major junctions of the dam show no signs of distress. The masonry at the junctions of the north abutment to the spillway and the spillway to the outlet structure of the dam were found to be tight.

e. Drains - a 4-inch drain pipe was observed at the bottom of the downstream face of the spillway. A 1-inch pipe was also observed cast into the downstream face of the spillway adjacent to the outlet gate section of the dam. The 4-inch drain was found to be essentially clogged with lime. The 1-inch drain could not be observed directly and no seepage was noted.

f. Water Passages - the three controlled outlet gate sluiceways were found to be in generally good condition. The concrete roof section of these sluiceways had substantial limestaining and spalling. The stone masonry sections were in fair condition, and no erosion was noted. The mortar was found to be loose or missing near the outlet end of the passages.

g. Seepage or Leakage - seepage was noted coming through the face of the spillway portion of the dam at a point approximately 10 feet below the crest of the spillway. Seepage was confined to the southern half of the spillway section. Seepage was also observed around the penstock and in the face of the dam above the controlled outlet gates.

h. Monolith Joints - not applicable.

i. Foundation - the foundation of the dam was placed directly on bedrock. No undermining or distress of the foundation of the dam was noted, however, significant erosion has occurred in the bedrock downstream of the dam.

j. Abutments - the abutments of the dam appear to be founded on bedrock, however the foundation could not be directly observed. No sign of distress was noted at either the north or south abutment.

2. EMBANKMENT STRUCTURES

Both the north and south wings of the dam consist of stone masonry walls with earth fill embankment.

a. Settlement - no signs of settlement of the embankment portions of the dam were observed.

b. Slope Stability - the embankment sections are generally covered with brush and small trees. No sign of instability was noted. The slopes are generally quite flat.

c. Seepage - no seepage from the embankment portions of the dam was observed.

d. Drainage Systems - no drainage systems were observed and none known to exist in the embankment portion of the dam.

e. Slope Protection - slope protection for the embankment sections of the dam consists of a established growth of grass and woods with some brush and small trees. No serious erosion was evidenced.

3. SPILLWAY STRUCTURES

The spillway consists of a broad crested stone weir. The cut granite blocks are mortared and iron pins connect the cap stones to the dam.

a. Control Gates - not applicable.

b. Unlined Saddle Spillways - none.

c. Approach and Outlet Channels - both the approach and outlet channels are reasonably clear and unobstructed.

d. Stilling Basin - the stilling basin consists of bedrock in the downstream channel. Significant erosion has occurred in the bedrock in several areas in the downstream channel. In the north side of the channel, cement grout has been placed over the bedrock. This grout is generally in good condition.

4. OUTLET WORKS

The outlet works consist of three gates which outlet to the downstream channel and one large gate which controls flow to the penstock which outlets about 90 feet downstream of the dam.

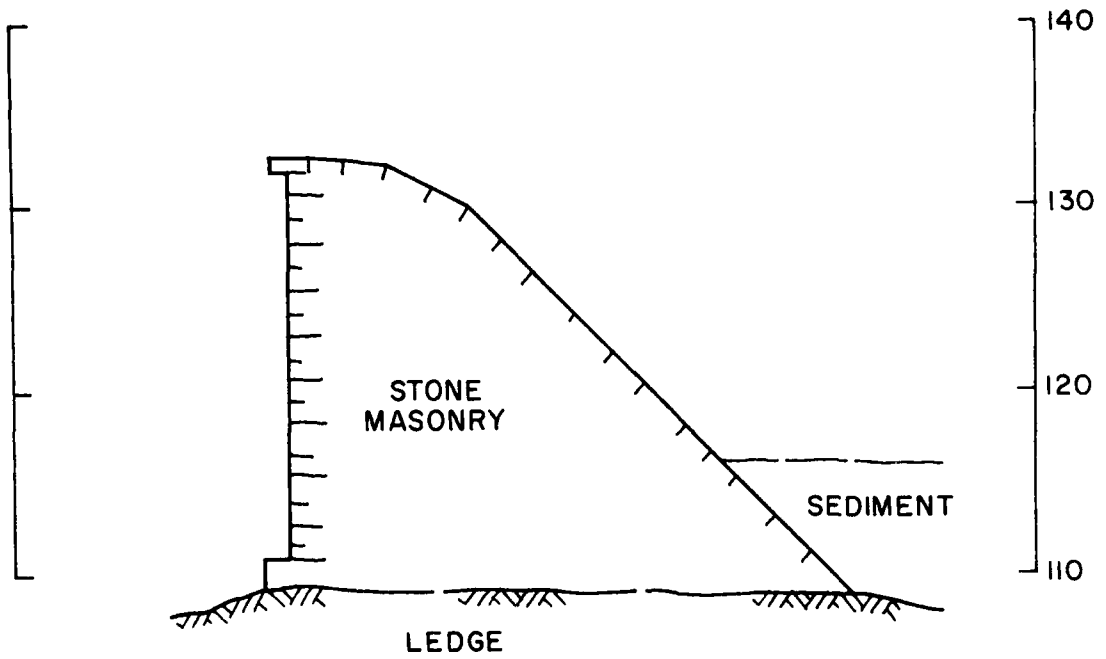
a. Inlet Structure - the inlet structure for the three gates consist of granite block walls which are in good condition. No trash rack exists above these gates and no debris was observed in or around the gates. The inlet structure for the penstock gate consists of granite block which is in good condition. There is a trash rack upstream of the gate. The trash rack was observed to be heavily covered with brush and debris and was impeding flow into the penstock. The iron bars and supports of this trash rack are severely rusted and deteriorated.

b. Operating and Emergency Control Gates - the gates are all constructed of timber and are found to be in poor condition. The gates are operated by vertical stem and rack and gear mechanisms. The gates are manually operated. The operating mechanism on the gates was found to be in poor condition with broken gears and bearings. No gates were operated during the inspection and only one of the outlet gates appears operable. The penstock gate is broken and allowing water to pass through the penstock. Substantial leakage was also observed through the center outlet gate.

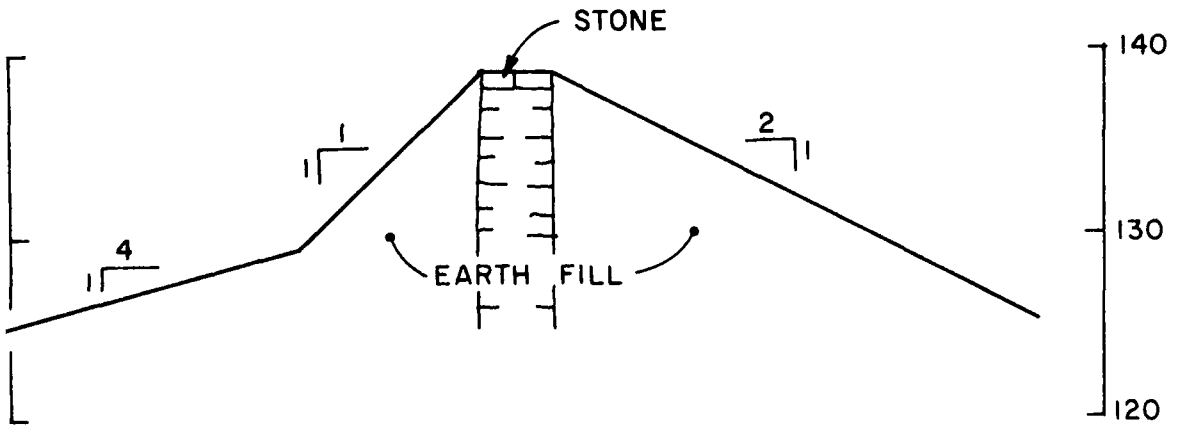
APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report.
See sheet B-2.2 for photograph locations and orientations.



SECTION C



SECTION D

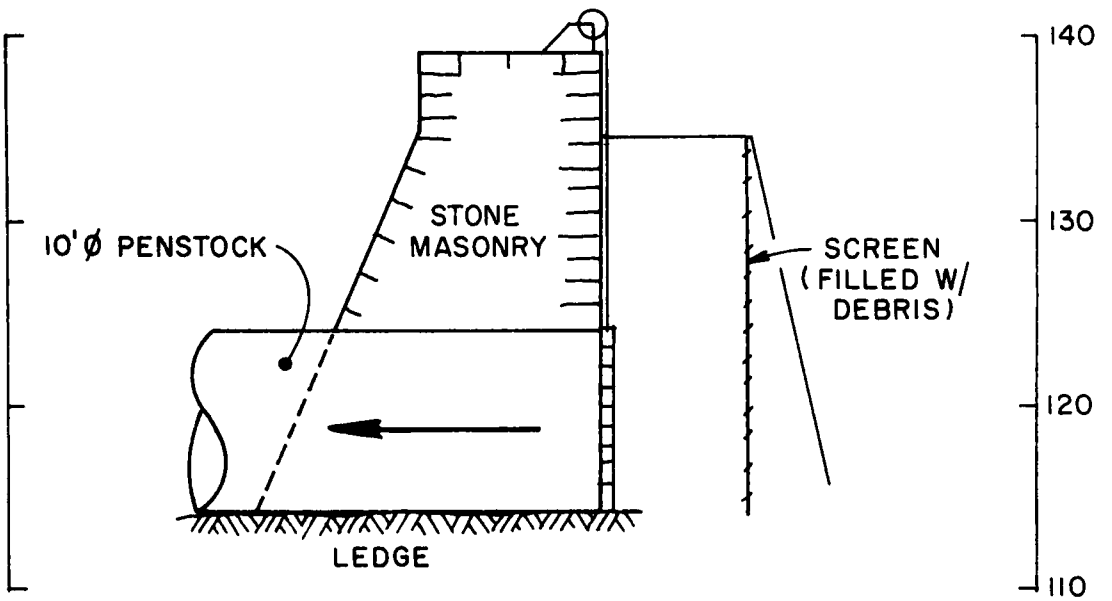
EDWARD C. JORDAN CO., INC
PORTLAND, MAINE

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

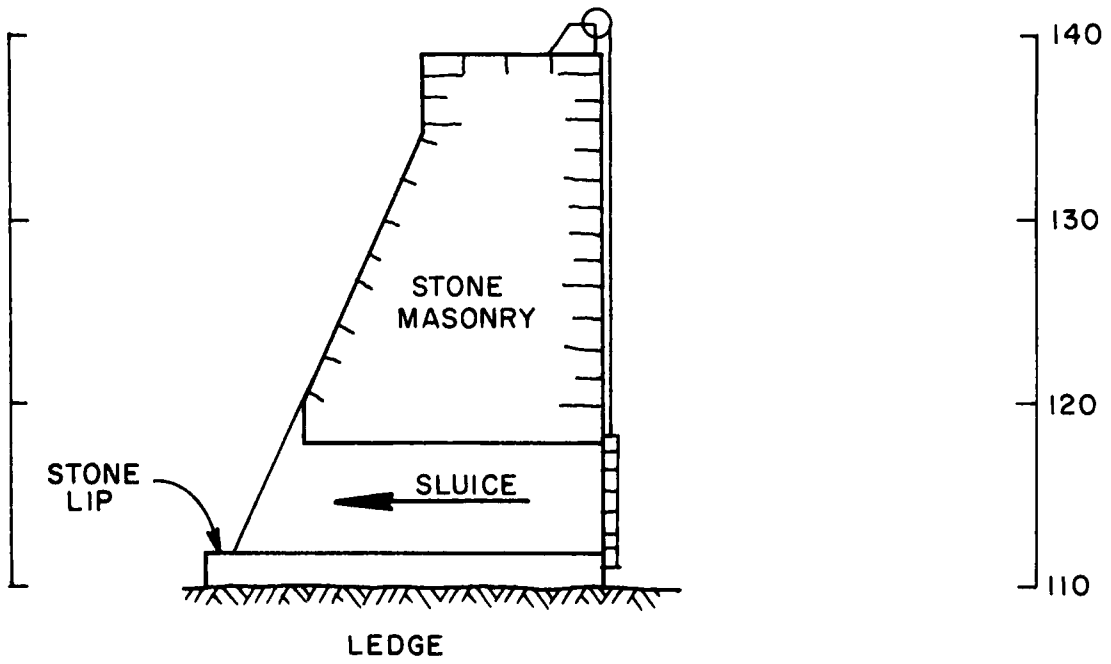
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

AMERICAN TISSUE DAM
X - SECTIONS

COBBOSSEECONTEE STREAM MAINE



SECTION A



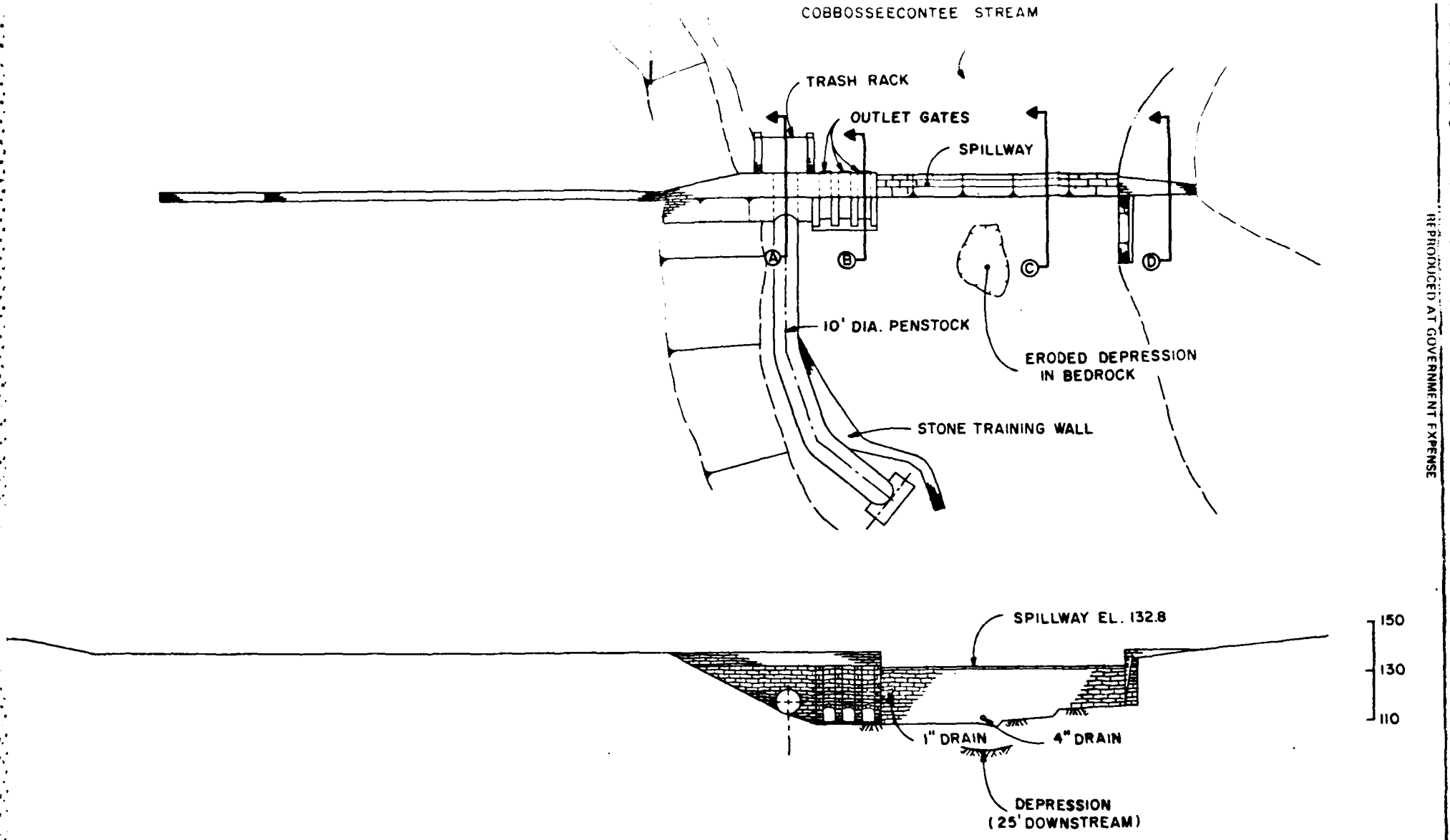
SECTION B

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE

U.S. ARMY CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

AMERICAN TISSUE DAM
X-SECTIONS
COBBOSSEECONTEE STREAM MAINE



AMERICAN TISSUE DAM
PLAN AND PROFILE
COBBOSSEECONTEE STREAM MAINE

APPENDIX B-2

GENERAL PROJECT DATA

No "as built" drawings showing plans, elevations and sections of American Tissue Dam were available. A plan, elevation and sections, with limited amount of detail developed as a part of the visual inspection of this dam are attached to this section.

September 23, 1976

)rder:

American Tissue Mills, Incorporated shall immediately make the necessary repairs to the gates making them operable.

The repairs be completed before 1 December 1976 to allow filling of the impoundment the winter sets in.

The State Inspector of Dams shall be notified when work is to commence and the expected date of completion.

The above repairs shall be made in accordance with existing applicable environmental laws and regulations.

Respectfully Submitted,

Redington Robbins, III

Redington R. Robbins, III, P.E.
Maine State Inspector of Dams and Reservoirs

Dated: 23 September 1976

RRR:lsp

September 23, 1976

Findings:

The gate structures have been numbered 1 thru 4 for purposes of identification for this report only with number 1 being the penstock gate.

1. Penstock gate number 1 is not operational due to a broken gear assembly and the teeth stripped off the primary driving gear.

2. Gate number 2 is not operational due to broken wooden stems resulting in no way to raise or lower the gate.

3. Gate number 3 is operational; but does not completely shut off the water.

4. Gate number 4 nearest the dam overflow spillway has the control gears stripped off the main driving gear.

5. The water levels behind the dam cannot be sufficiently regulated in accordance with the design of the dam due to inoperable gates.

6. Continued frost action during low water could cause the dam structure to deteriorate and become a safety hazard to persons residing downstream.

Dam Hearing Con't

September 23, 1976

8. On 5 November 1975, reappointed State Inspector of Dams and Reservoirs by Governor James B. Longley. *Dam Hearing* postponed until spring due to ice conditions and high water.

9. On 9 March 1976, a dam hearing was scheduled for 1 April 1976 at the Gardiner City Hall. (Copy Enclosed)

10. On 29 March 1976, received a letter from George J. Malinsky, Esq. on behalf of American Tissue Mills, Incorporated that the hearing be postponed until 17 June 1976 because of prior professional and other personal commitments. The postponement was also agreeable to the City of Gardiner. (Copy Enclosed)

11. On 23 April 1976, the hearing was re-scheduled for 17 June 1976 at the Gardiner City Hall. (Copy Enclosed)

12. On 26 April 1976, received letter from City of Gardiner stating "The gates on the American Tissue dam are not in an operative condition... We are of the opinion that this dam should be maintained in good repair and that all its gates should be replaced and remain in good operating condition." (Copy Enclosed)

13. On 17 June 1976, a hearing was held at Gardiner City Hall. Much of the discussion was about the gates in disrepair and the fear of frost action on the dam if the impoundment is not full of water during the winter months which could result in the failure of the dam during spring runoff.

    According to hearing testimony, failure of the dam could result in damage the Yorktowne dam and flooding of the business adjacent to the Arcade Parking Lot.

    Messrs. Malinsky and Usdans both stated that they had no knowledge of the operation of the gates or a recent inspection of the dam by a professional engineer as to its safety and sufficiency. No plans were available from the owners at the time of the hearing. The owners representatives stated they feel the dam does not show immediate danger to the people of Gardiner.

    The hearing was held open for 45 days (1 August 1976), by agreement of both parties, to allow the City or owners to submit additional information or engineering reports.

14. On 17 June 1975, I inspected the dam before and after the hearing. The dam spillway and granite block appears to be structually sound. The wooden stem on the middle gate is broken. The gear hoisting mechanism is broken on two gates, making three of four gates inoperable when the gates were tested by myself after permission from Messrs. Malinsky and Usdans to do so. The one remaining gate is operable but the water is not completely shut off.

15. On 16 August 1976, I telephoned Mr. Mac Donald, Public Safety, City of Gardiner, he indicated no further comments.

16. On 20 September 1976, I telephoned Mr. Paul Hermann, Gardiner City Manager, he indicated no further comments.

September 23, 1976

Statement of Facts from Personal Knowledge and Testimony at Dam Hearing 17 June 1976.

1. American Tissue Mills Dam so-called is located downstream from the New Mills (Gardiner Water District) on Cobbossee Stream, Gardiner and is owned and/or operated by American Tissue Mills, Incorporated, 45 NW Statler Plaza, Great Neck, New York 11021.

2. The dam is made of cut granite block pinned with iron "U" bolts placed on bedrock in the stream bed. The controllable outlet structure consist of:

   (a) Three moveable wooden gates discharging from the bottom. Controlled by gear driven wooden stems to raise each gate.

   (b) One screened penstock controlled by a wooden stemmed gate.

   (c) The overflow section appears to be designed to take the excess stream flows in the spring. It consists of granite blocks mortared and pinned together.

   At the Hearing, representatives of the owner Messrs. George J. Malinsky, Esq: and David Usdans testified that they didn't know how the dam and gates where contructed.

3. On 25 April 1975, Paul H. Hermann, City Manager, City of Gardiner requested an inspection of the dam by the Bureau of Civil Emergency Preparedness to determine the adequacy and safety. (Copy Enclosed)

4. On 16 May 1975, both as Inspector of Dams and Reservoirs and an employee of MECEP, I visited the dam accompanied by Messrs. Ray Roy and Lee Day of MECEP, Code Enforcement Officer of Gardiner and Paul H. Hermann, City Manager. The penstock gate was leaking water causing water to drain through the old mill foundation and ruins. The gate control structures were broken on two gates. On one gate structure, the gear stantion were broken making it inoperable and the wooden stem on another was broken. Mr. Paul Hermann was advised to file a petition with the State Inspector of Dams and Reservoirs.

5. On 23 May 1975, a petition from City of Gardiner dated 20 May 1975 in accordance with MRSA 1964, Title 38, Sections 811-813 was received by the State Inspector of Dams and Reservoirs to cause a dam hearing to be held. (Copy Enclosed)

6. On 26 June 1975, State Inspector of Dams and Reservoirs term expired, however he continues until replaced or reappointed by Governor.

7. On 20 August 1975, Mr. Lee Day, Bureau of Civil Emergency Preparedness researched the proper owner of the subject dam. American Tissue Mills, Incorporated appeared to be the owner.

REPORT

OF

AMERICAN TISSUE MILLS DAM

COBBOSSEE STREAM

GARDINER, MAINE

HELD

17 JUNE 1976

REDINGTON R. ROBBINS, III, P.E.
MAINE STATE INSPECTOR OF DAMS
AND RESERVOIRS

APPENDIX B-1

INSPECTION HISTORY

An inspection of the American Tissue Dam was made and a hearing was held in June 1976. A copy of a report of that inspection and hearing is enclosed.

APPENDIX B

ENGINEERING DATA

This appendix lists the engineering data collected either from project records and other sources or data developed as a result of the visual inspection. The contents of this appendix are listed below.

Appendix	Description
B-1	Inspection History
B-2	General Project Data

8. OPERATING AND MAINTENANCE FEATURES

a. Reservoir Regulation Plan - none.

b. Maintenance - visual observation indicated that no maintenance had been done on the dam in recent years. The dam structure appears to be in reasonably good condition, however, the gate works as noted above, are essentially inoperable.

f-1

c. Water Passages - consists of stone masonry for the 3 gates and a riveted steel pipe with a reinforced concrete lining for the penstock.

d. Stilling Basin - consists of a bedrock channel. Severe erosion.

e. Approach Channel - the approach channel to the gates appears to be reasonably clear and unobstructed. There appears to be no buildup of silt. A substantial amount of driftwood was observed immediately upstream of the gates.

f. Drawdown Facilities - drawdown facilities consist of the three outlet gates and the penstock gate. Only one of the outlet gates appears operable, the other two are inoperable and the penstock gate is inoperable.

5. SAFETY AND PERFORMANCE INSTRUMENTATION

None.

6. RESERVOIR

a. Shore Line - no major active or inactive landslide areas on the American Tissue Dam Pond were observed.

b. Sedimentation - the watershed has remained essentially rural in nature over the past years. There are no new developments or new sources of sediment loads on the pond.

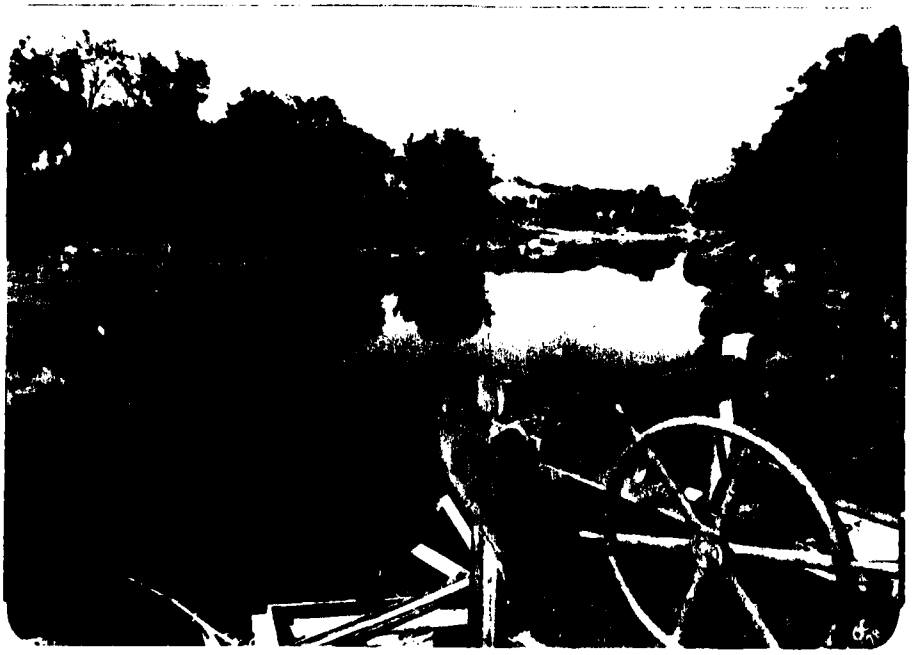
c. Potential Upstream Hazard Areas - no apparent structures would be affected by maximum water storage pool elevations, but many could be affected by probable maximum flood elevations.

d. Watershed Runoff Potential - the drainage basin has remained essentially rural with very few changes in development over the past several years.

7. DOWNSTREAM CHANNEL

The channel downstream of the dam has sufficient capacity to carry away flood flows from the dam. In the event of failure of the dam, it appears that the Yorktown Paper Company buildings, about 750 feet downstream, would be damaged. Thus the American Tissue Dam is classified as having a high hazard potential.

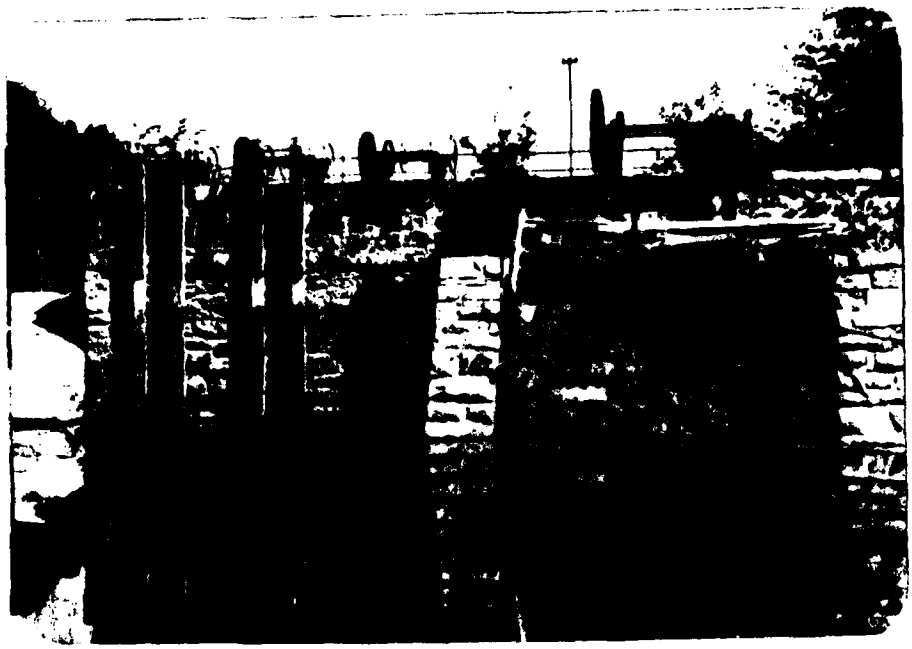
1
DOWNSTREAM VIEW



2
UPSTREAM VIEW

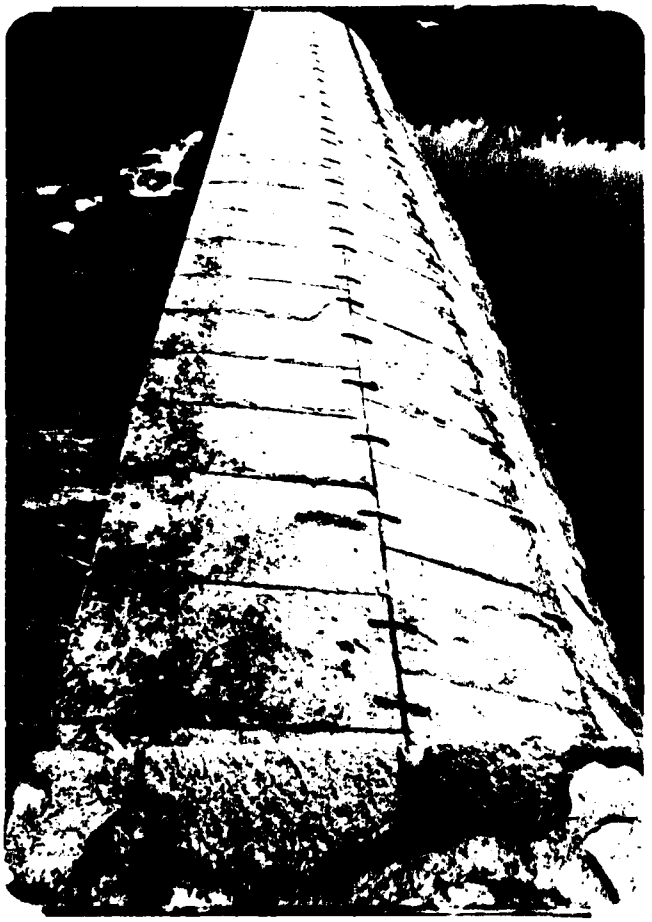
3
BEDROCK ON DOWNSTREAM SIDE OF DAM

4
VIEW OF OLD MILL SITE AND DOWNSTREAM SIDE OF DAM



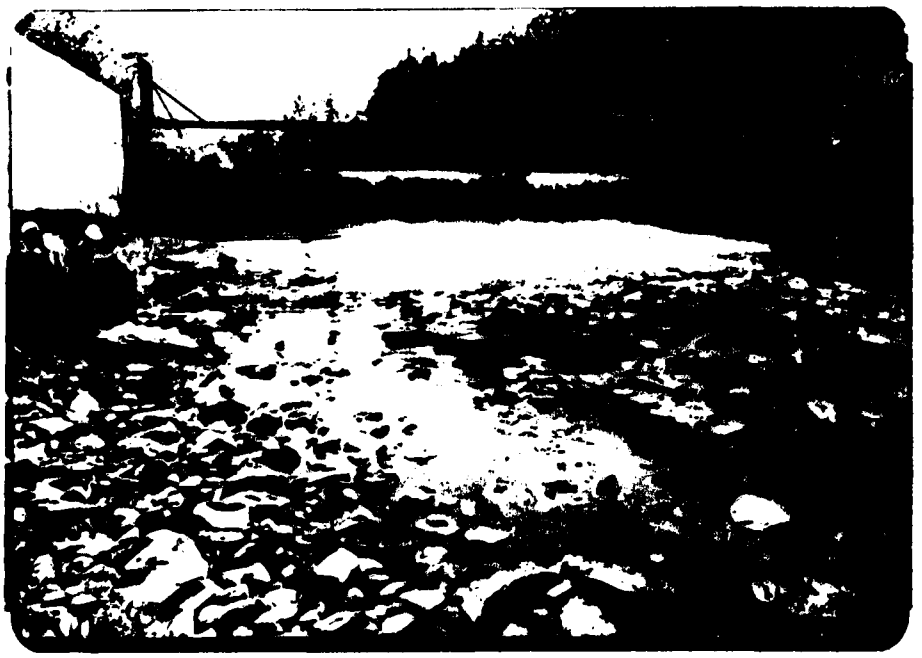
5
UPSTREAM VIEW OF GATES AND PENSTOCK

6
DOWNSTREAM VIEW OF GATES AND PENSTOCK



7
DAM SPILLWAY CREST

8
GARDINER WATER DISTRICT DAM



9
YORKTOWN DAM

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Hydrologic and hydraulic computations pertinent to this investigation are attached to this section. Also a figure showing a map of the Cobbosseecontee Stream Watershed boundary is shown in this section.

EDWARD C. JORDAN CO., INC.
PORTLAND, MAINE

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED DAMS

AMERICAN TISSUE DAM

COBBOSSEECONTEE STREAM RIVER

DATE SEPT. 1978

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
SPILLWAY FLOWS	BTC	2051.3 C
	CHK BY	DATE
	JHF	7-19-18

$Q = CLH^{3/2}$, $L = 99.7'$

"C" Taken From Table 3.11 page 3-44
Bodhaine & King, Handbook of Hydrology, 1976

HEAD ft	ELEV	C	$Q = CLH^{3/2}$
0	132.8	0	0
0.2	133.0	3.41	30
0.7		3.41	179
1.2	134.0	3.41	441
1.7		3.57	788
2.2	135.0	3.65	1187
2.7		3.70	1637
3.2	136.0	3.72	2123
3.7		3.73	2647
4.2	137.0		3201
4.7			3787
5.2	138.0		4410
5.7			5061
6.2	139.0		5741
6.7			6449
7.2	140.0		7185
7.7			7946
8.2	141.0		8732
8.7			9543
9.2	142.0		10377
			11235
10.2	143.0		12114
			13016
11.2	144.0		13939
			14883
12.2	145.0		15847
12.7			16831
13.2	146.0		17835
14.2	147.0		18858
	148.0		19897
	149.0		20955
	150.0		22031
18.2	151.0		23124
19.2	152.0		24235
			25362
			26506
			27666
			28841
			30032
			31238

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
FLOW OVER DAM	BTB	20583 07
	CHK BY	DATE
	JHF	9-19-78

L = 325 + 35 = 360'

C = 2.63 {Broad Crested weir - Brater & King / Handbook of Hydraulics, 1976}

TOP OF DAM = 139.2'

HEAD (ft.)	ELEV.	C	Q=CLH^3/2
0	139.2	0	0
0.3	139.5	2.63	156
0.8	140.0	↓	677
1.3			1403
	141.0		2286
2.3			3303
	142.0		4436
3.3			5676
	143.0		7013
4.3			8442
	144.0		9957
5.3			11552
	145.0		13225
6.3			14972
	146.0		16781
7.3			18674
	147.0		20625
8.3			22640
	148.0		24716
9.3			26852
9.8	149.0		29047
			31298
10.8	150.0		33604
			35765
11.8	151.0		38318
			40843
12.8	152.0		43358

Rel w. + 05' [illegible]
Y' 1.5 = x [illegible]
page 107

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
STORAGE - DISCHARGE TABLE	BTB	2058307
	CHK BY JHF	DATE 12-5-78

ELEVATION	CFS DISCHARGE	Ac-Ft STORAGE
133	30	0
	447	2
135	1187	4
	2123	6
137	3201	8
	4410	10
139	5741	28 12
	7862	63 82
141	11018	96 16
	14813	128 18
143	19127	160 20
	23896	192 22
145	29072	224 24
	34624	256 26
147	39483	288 28
	44615	320 30
149	50006	352 32
	55642	384 34
151	67252	416 36
	74644	448 38

Calculations for flows through the river gates and penstock follow. However, since it is questionable whether these structures are operable, flows through these openings are not included in the storage-discharge table.

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
RIVER GATES	BTB	20563 07
	CHK BY	DATE
	JWJ	9-19-78

5' WIDE X 5'6" HIGH @ SIDE OF ARCH

6'3" @ CENTER OF ARCH

AREA = $5\left(\frac{5.5+6.3}{2}\right) = 29.5$ □

INVERT = 110.5'

℄ ELEV = 113.5

$Q = C A \sqrt{2gh}$

$C = 0.7$

POOL ELEV	ft HEAD	Q, cfs	POOL ELEV	HEAD	Q, cfs
1135	0	—	142	28.5	2654
					2700
120	6.5	1267	144	30.5	2746
		1361			2790
122	8.5	1447	146	32.5	2834
		1532			2877
124	10.5	1611	148	34.5	2920
		1686			2962
126	12.5	1758	150	36.5	3004
		1827			3044
128	14.5	1893	152	38.5	3085
		1957			3125
130	16.5	2017	154	40.5	3164
		2080			
132	18.5	2138			
		2195			
134	20.5	2251			
		2305			
136	22.5	2358			
		2410			
138	24.5	2461			
		2510			
140	26.5	2557			
		2607			

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
FLOW THROUGH PENSTOCK	BTB	20583.07
	CHK BY	DATE
	JHF	9-19-78

10' DIA, $A = 78.5$ ft²

TOP = 123.07'

INVERT = 123.07 - 10 = 113.07' @ DAM

$Q = CA\sqrt{2gh}$, $C = 0.7$ {Brater & King, 1976}

ELEV. = 118.07'

POOL ELEV.	ft. HEAD	$Q = CA\sqrt{2gh}$
124	5.93	1074
126	7.93	1161
128	9.93	1242
130	11.93	1318
132	13.93	1390
134	15.93	1457
136	17.93	1521
138	19.93	1582
140	21.93	1640
142	23.93	1695
144	25.93	1747
146	27.93	1797
148	29.93	1845
150	31.93	1891
152	33.93	1935

COPIED EDWARD C. JORDAN CO., INC.

PROJECT	~~COMP~~ BY	JOB NO.
log-Pearson Type III from USGS-Augusta	BTB	2051307
	CHK BY	DATE 7-12-78

COBBOSSEECONTEE STREAM
AT GARDNER, ME # 01049500

Recurrence Interval, yrs	Discharge, cfs
10	3238
25	3746
50	4102
100	4441
200	4767
500	5182

Flood Year	Discharge, cfs	Approx. Recurrence
1936	4320	~100
1922	4250	> 50
1921	3910	> 25
1917	3870	> 25
1920	3580	> 10
1903	3280	10
1901	3200	10

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
MAXIMUM PROBABLE FLOOD CALCULATION	BTP	20583 07
	CHK BY JHF	DATE 12-5-78

D.A. = 217 Sq Mi

D.A. Flat & Coastal

From C.O.E. MPF Peak Flow Rate:

MPF Q = 310 CFS / Sq Mi

MPF Q = 310 (217) = 67,300 CFS

According to 10 Mar 78 Inventory:

Normal Impounding Capacity = 108 Ac-Ft

Maximum " " = 120 Ac-Ft

According to Visual Inspection:

Pool Length = 1200'
width = 450'
Depth @ Spillway ≅ 15' @ Elev. 132.8
Inlet Depth ≅ 3'

Normal Storage, $S_N = \frac{1200(450)\left(\frac{15+3}{2}\right)}{43560}$

S_N = 111 Ac-Ft, OK USE 108 Ac-Ft

Maximum Storage, $S_M = \frac{1200(450)\left(\frac{21+9}{2}\right)}{43560}$

S_M = 186 Ac-Ft, OK USE S_M = 120 Ac-Ft

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
STORAGE ABOVE SPILLWAY CREST	BTB	20583
	CHK BY JAE	DATE 7-19-78

Approximately @ Elev. 138' the Cumberland Water District Dam 1200' upstream of the American Tissue Dam becomes submerged.

Pleasant Pond (Impounded by Cumberland Water District Dam) @ 134' on USGS

Pleasant Pond
Area-Storage Table

Elevation	Acres Area	Ac-Ft Storage	Ac-Ft Amer-Tissue Storage	Ac-Ft Total Storage
134	883[1]	0	0	0
136			2	2
138			4	4
			6	6
			8	8
			10	10
	2800	2800	12	2812
Contour 140	3184[1]	6368	14	6382
	3200	9600	16	9616
142		12800	18	12818
		16000	20	16020
144		19200	22	19222
		22400	24	22424
146		25600	26	25626
		28800	28	28828
148		32000	30	32030
		35200	32	35232
150		38400	34	38434
		41600	36	41636
152	3200	44800	38	44838

1 Planimetered from USGS MAP

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
EFFECT OF SURCHARGE STORAGE	BTB	205830.
	CHK BY JHF	DATE 12-5-78

$Q_{p1} = 67,300$ CFS

Elev. to pass $Q_{p1} = 151.01$

$151.0 - 132.8 = 18.2'$

$STOR_1 = 41655$ Ac-Ft

or $= \frac{41655}{217 \times 640} \times 12 \frac{in}{ft.} = 3.60"$

$$Q_{p2} = Q_{p1} \times \left(1 - \frac{STOR_1}{19}\right)$$

$$Q_{p2} = 67300\left(1 - \frac{3.60}{19}\right) = 54548 \text{ CFS}$$

Elev. to pass $Q_{p2} = 149.81$

$149.81 - 132.8 = 17.0'$

$STOR_2 = 37812$ Ac-Ft

or $\frac{37812}{217 \times 640} \times 12 = 3.27"$

$$Q_{p3} = 67300\left(1 - \frac{3.60 + 3.27/2}{19}\right)$$

$Q_{p3} = 55,133$

Elev. to pass $Q_{p3} = 149.91$

$149.91 - 132.8 = 17.1'$

$STOR_3 = 38145$ Ac-Ft

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
EFFECT OF SURCHARGE STORAGE, cont.	BTB	2058307
	CHK BY JWF	DATE 12-5-78

or $STOR_3 = \frac{38145}{217 \times 640} \times 12 = 3.30''$

$$Q_{p4} = 67300 \left(1 - \frac{3.27 + 3.30/2}{19}\right)$$

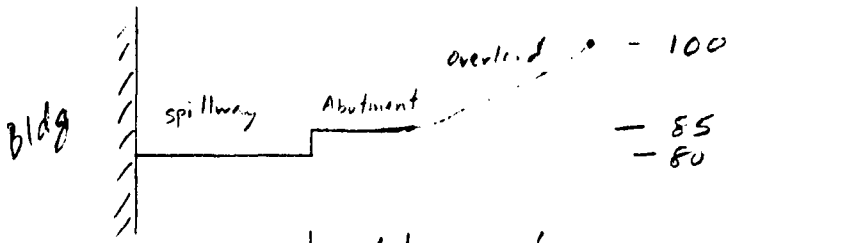
$Q_{p4} = 55,664$ CFS $\cong$ 55,700 CFS

Elev. to pass Q_{p4} = 150.00'

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
RATING CURVE AT YORKTOWN DAM - 750' Downstream	BTE	20583.07
	CHK BY JHF	DATE 9-21-78

$S = \frac{10}{750} = 0.013$



$Q = CLH^{3/2}$ $C = 2.63$ $Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$, $n = 0.07$

ELEV.	Spillway Q	Abutment Q	Overland Q	Total Q	Storage Volume V
80				0	0
85	1997	0	0	1997	5.9
90	5655	735	557	6947	16.0
95	10390	2079	3541	16010	30.5
100	15996	3820	10440	30256	49.2
96	11446	2399	4565	18410	33.9
97				21139	37.6
98	13658	3082	7128	23868	41.2
99	14811	3444	8686	26941	45.1

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
DAM FAILURE PROBLEM	RTB	205830
	CHK BY	DATE
	JHF	9-21-78

$S = 120$ Ac-Ft

$Q_{p1} = 8/27\ W_b \sqrt{g}\ Y_o^{3/2}$

$Y_o = 23'$

$W_b = 0.4(351') = 142.8'$

$Q_{p2} = 8/27\ (142.8)\sqrt{g}\ 23^{3/2} \cong 26,500$ cfs

$\frac{1}{2} Q_p T = 12.1\ S$

$T = \frac{12.1(120)}{\frac{1}{2}(26,500)} = 0.11$ hr. $= 6.6$ min.

Q_{p2} @ YORKTOWN DAM

Q_{p2} @ 98.86'

$V_1 = 44.5$ Ac-Ft

Q_{p2} (TRIAL) $= Q_{p1}\left(1 - \frac{V_1}{S}\right)$

Q_{p2} (TRIAL) $= 26,500\left(1 - \frac{44.5}{120}\right) = 16,670$

Q_2 (TRIAL) @ 95.28, $V_2 = 31.5$

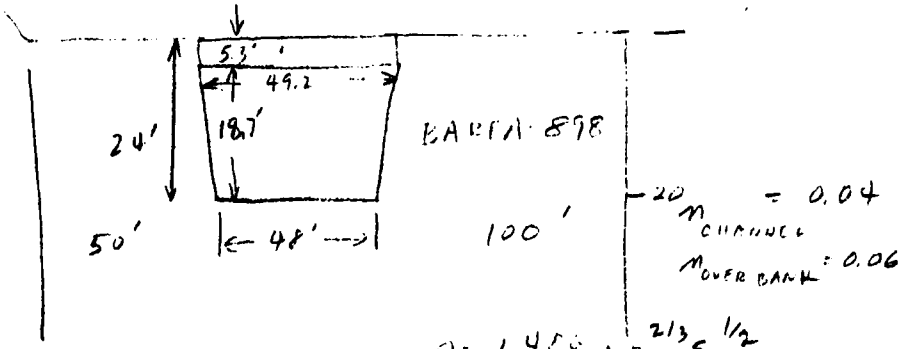
$Q_2 = Q_{p2}\left(1 - \frac{V_{AVE}}{S}\right) = 26,500\left(1 - \frac{38}{120}\right) = 18,100$ cfs

STAGE = 96' or 16' Above Spillway Crest

EDWARD C. JORDAN CO., INC.

PROJECT	COMP BY	JOB NO.
RATING CURVE AT WINTER ST - 215' Downstream of Winter Dam	BTB	20583.07
	CHK BY	DATE
	JHF	7-21-78

$S = \frac{70}{2750} = 0.0255$



$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

ELEV	AREA (ft^2)	Q (cfs)	V fps	$\frac{V^2}{2g}$
20	898	18891	21	6.9

Water surface would jump over Winter St, but flow would generally be contained in a narrow flood plain.

Very high vel. ∴ assume section to be orifice w/ 5' head and determine flow

$Q = CA\sqrt{2gh}$

$Q = (0.7)(898)\sqrt{2(32.2)(5)}$

$= 11280\ cfs.$

∴ above note is true

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR'L ST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
ME	98	NED	ME	011	01				AMERICAN TISSUE DAM	4414.0	6947.0	20	OCT	78

POPULAR NAME	NAME OF IMPOUNDMENT
	MAIN STEM COBBOSSEECONTEE STREAM

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	03	COBBOSSEECONTEE STREAM	GARDINER	0	7000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REGRG	1911	S	24	22	2812	108	NED	N	N	N	N	20OCT78

REMARKS

D/S HAS	SPILLWAY CREST LENGTH (FT.)	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
1	450	U	100	5880	7200											

OWNER	ENGINEERING BY	CONSTRUCTION BY
ALLEN PAPER CO.		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
EDWARD G. JORDAN CO. INC.	15	AUG	78	PL 92-367

REMARKS

END

FILMED

7-85

DTIC